

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

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*Ex parte* GREG HAHN, ZILI SUN, CARLOS ZAMUDIO, JASON HUGENROTH,  
THOMAS BARITO, JAMES W. BUSH, JOE T. HILL, AND JOHN R. WILLIAMS

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Appeal No. 2003-1836  
Application No. 10/085,590

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ON BRIEF

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Before BARRETT, BARRY, and SAADAT, *Administrative Patent Judges*.  
BARRY, *Administrative Patent Judge*.

**DECISION ON APPEAL**

A patent examiner rejected claims 20-23 and 25. The appellants appeal therefrom under 35 U.S.C. § 134(a). We affirm.

**BACKGROUND**

The invention at issue on appeal monitors a compressor to identify faults therein. A cooling systems uses a compressor to compress a refrigerant. In a scroll compressor, for example, two spiral scroll wraps orbit relative to each other to

compress entrapped refrigerant. Modern compressors are typically enclosed in a sealed housing and driven by a motor. (Spec. at 1.)

The appellants explain that conventional compressors include multiple protection devices, each actuated under certain conditions. (Appeal Br. at 3.) Aiming to eliminate the separate protection devices, (*id.*), the appellants mount a microprocessor ("μP") on a sealed scroll compressor. During operation of the compressor, the μP analyzes a number of system variables for faults. If it identifies a fault, the μP actuates a warning signal. (*Id.* at 2.) Data representing the fault are stored for later analysis. (Spec. at 14.)

A further understanding of the invention can be achieved by reading the following claim.

20. A method of monitoring operation of a compressor comprising the steps of:

(1) providing a scroll compressor mounted within a compressor housing, also providing a microprocessor control for controlling said compressor mounted on said scroll compressor housing, and providing sensors on said compressor to supply data to said control with regard to operation of said scroll compressor at both suction and discharge areas;

(2) operating said compressor, and sending data to said control;

(3) analyzing said data at said control and identifying a fault at least based on said data from step 2; and

(4) sending a signal at least when a fault is identified in Step (3).

Claims 20-23 and 25 stand rejected under 35 U.S.C. § 112, ¶ 2, as indefinite.

Claims 20-23 also stand rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,765,150 ("Persem") and U.S. Patent No. 6,302,654 ("Millet"). Claim 25 also stands rejected under § 103(a) as obvious over Persem; Millet; and U.S. Patent No. 5,350,039 ("Voss").

## OPINION

Our opinion addresses the rejections in the following order:

- indefiniteness rejection
- obviousness rejection over Persem and Millet
- obviousness rejection over Persem, Millet, and Voss.

### A. INDEFINITENESS REJECTION

Rather than reiterate the positions of the examiner or the appellants *in toto*, we address the point of contention therebetween. The examiner asserts, "whether or not data is considered a 'fault' is purely arbitrary which renders as uncertain the scope of

the claims." (Final Rejection at 3.<sup>1</sup>) The appellants argue, "a worker of ordinary skill in this art would recognize that a fault is some undesired condition occurring. . . ." (Appeal Br. at 4.)

"The test for definiteness is whether one skilled in the art would understand the bounds of the claim when read in light of the specification. *Orthokinetics Inc., v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 USPQ2d 1081, 1088 (Fed. Cir. 1986). If the claims read in light of the specification reasonably apprise those skilled in the art of the scope of the invention, Section 112 demands no more. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1385, 231 USPQ 81, 94 (Fed. Cir. 1986)."  
*Miles Labs., Inc. v. Shandon Inc.*, 997 F.2d 870, 875, 27 USPQ2d 1123, 1126 (Fed. Cir. 1993). "Even if . . . claims are . . . broader than they otherwise would be, breadth is not to be equated with indefiniteness. . . ." *In re Miller*, 441 F.2d 689, 693, 169 USPQ 597, 600 (CCPA 1971).

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<sup>1</sup>"We advise the examiner to copy his rejections into his examiner's answers," *Ex parte Metcalf*, 67 USPQ2d 1633, 1635 n.1 (Bd.Pat.App.& Int. 2003), rather than merely referring to "rejections . . . set forth in prior Office Action. . . ." (Examiner's Answer at 3.)

Here, claim 20 recites in pertinent part the following limitations: "providing sensors on said compressor to supply data to said control with regard to operation of said scroll compressor at both suction and discharge areas; (2) operating said compressor, and sending data to said control; [and] (3) analyzing said data at said control and identifying a **fault** at least based on said data from step 2. . . ." (Emphasis added). Although the claim may not identify specific faults, such an omission is a matter of breadth, not of indefiniteness. Therefore, we reverse the indefiniteness rejection of claims 20-23 and 25.

#### B. OBVIOUSNESS REJECTION OVER PERSEM AND MILLET

We address the following points of contention between the examiner and the appellants:

- controlling a scroll compressor
- mounting a control on the compressor's housing
- providing a warning
- stopping a motor
- storing fault identifying data.

##### *1. Controlling a Scroll Compressor*

The examiner finds, "MILLET et al. disclose an electric motor driven scroll (rotary) compressor. A compressor protection and control subsystem 86 is mounted within electrical case 84, which case is mounted to shell 12 (compressor housing) (see

col. 4, para. 4)." (Examiner's Answer at 5.) He further finds, "Millet et al. disclose the advantages of scroll compressors such as their capability of extremely efficient operation." (Final Rej. at 3.) In view of these teachings, he asserts, "it would have been obvious to substitute a scroll compressor for the reciprocating compressor of . . . Persem." (*Id.*) The appellants argue, "there is no suggestion in Millett, [sic] et al. that would suggest substituting a scroll compressor for the Persem reciprocating compressor." (Appeal Br. at 6.)

"The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact." *In re Gartside*, 203 F.3d 1305, 1316, 53 USPQ2d 1769, 1776 (Fed. Cir. 2000) (citing *In re Dembiczak*, 175 F.3d 994, 1000, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). "[T]he question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." *In re Beattie*, 974 F.2d 1309, 1311-12, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992) (quoting *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984)). "[E]vidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved. . . ." *Dembiczak*, 175 F.3d

at 999, 50 USPQ2d at 1617 (citing *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996); *Para-Ordnance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.3d 1085, 1088, 37 USPQ2d 1237, 1240 (Fed. Cir. 1995)).

Here, we find that evidence to combine flows from the references themselves. Persem discloses "a refrigeration compressor system," col. 1, ll. 6-7, which "includ[es] the compressor 22 and its control[ler] mechanisms." Col. 5, ll. 9-11. "The core of the controller 40 is a small computer 56, using a microprocessor (e.g., the INTEL 8088) for its central processing unit. The computer 56 receives input signals indicative of the state of the system . . . ." Col. 6, ll. 11-14. These input signals comprise "a temperature signal from temperature probe 60 . . . [,] **a suction pressure signal** from pressure gauge 62 . . . [,] **a discharge pressure signal** from pressure gauge 64[.] . . . a motor speed feedback signal[.]" *id.* at 23-29; "a fault signal from the inverter 48, and a signal indicating a low oil condition in the compressor apparatus 22." *Id.* at ll. 32-35 (emphases added).

A "fault checking routine . . . checks for the following faults: (1) **is the discharge pressure above a specified limit . . .**, (2) **is the suction pressure below a specified**

**value** . . . , (3) is the measured temperature above or below specified limits . . . , (4) is the motor speed feedback signal more than fifteen percent off from the specified speed, (5) is the motor oil fault signal active, and (6) is the inverter fault signal active." Col. 10, ll. 45-54 (emphases added). "If any of these fault conditions occurs, the error is logged in the system's memory 72, noted on the display 80, and the system switches to mechanical mode -- so that the mechanical backup system will take over control of the system." *Id.* at ll. 55-59. Furthermore, "[i]f the compressor's capacity exceeds the load even when running at its minimum speed, the controller will shut down the motor and set the state to CYCLOFF. . . ." Col. 12, ll. 13-16. "Serious faults are also denoted by activating the buzzer 84." Col. 10, ll. 60-63.

Although the "few specific embodiments," col. 13, l. 32, described by Persem feature "a reciprocating compressor," col. 5, ll. 28-29, not a scroll compressor, the reference emphasizes that "the description is illustrative of the invention and is not to be construed as limiting the invention." Col. 13, ll. 32-34. Furthermore, Persem recognizes that "[v]arious modifications may occur to those skilled in the art. . . ." Col. 13, ll. 34-35.



For its part, Millet explains that "[s]croll type machines are becoming more and more popular for use as compressors in . . . refrigeration . . . due primarily to their capability of extremely efficient operation." Col. 1, ll. 13-16. The appellants concur, admitting, "[i]t is true that scroll compressors are efficient." (Reply Br. at 2.) Because Persem allows modifications to its refrigeration compressor system; and Millet discloses that scroll compressors offer extremely efficient operation for refrigeration; we are persuaded that the references would have suggested using a scroll compressor in the refrigeration compressor system.

Regardless of the motivation to combine teachings from Persem and Millet, the latter reference itself would have suggested the claimed invention. More specifically, Millet discloses a "compressor protection and control subsystem . . . in association with a hermetic scroll compressor. . . . Compressor 10 comprises a generally cylindrical hermetic shell 12. . . ." Col. 3, ll. 36-42. An "[e]lectrical case 84 is mounted to shell 12. . . . Compressor protection and control subsystem 86 is mounted within electrical case 84. . . ." Col. 4, ll. 56-59." The subsystem incorporates . . . a serial peripheral interface," abs., ll. 17-18, "to allow communications between a microcontroller and integrated circuits on a board providing expanded peripheral functions." Col. 7, ll. 62-64.

Input terminals of the subsystem are connected to "a pressure sensor 146 which monitors the discharge pressure of compressor 10," col. 5, ll. 26-27, and "a pressure sensord [sic] 148 which monitors the suction pressure of compressor 10." *Id.* at ll. 28-29. A "[s]tatus display 94 is capable of displaying numbers and some alpha characters to indicate the various fault codes associated with compressor protection and control subsystem 86." *Id.* at ll. 6-9. "Once an undesirable characteristic is identified, the operation of the scroll machine is stopped." Abs., ll. 12-14.

## *2. Mounting a Control the Compressor's Housing*

The examiner finds that in Millet "compressor protection and control subsystem 86 is mounted within electrical case 84, which case is mounted to shell 12 (compressor housing) (see col. 4, para. 4)." (Examiner's Answer at 5.) The appellants ask, "[w]hy would one mount the Persem control 'on' the compressor housing?" (Appeal Br. at 6.)

Although Persem uses a microprocessor-based small computer 56 as a controller for its refrigeration compressor system, the reference does not address physical mounting of the controller. We find that the omission of such a detail and the recognition of modifications invites the use of known techniques for mounting a

controller. For its part, Millet discloses a known technique of mounting a controller to a refrigeration compressor system. To wit, the latter reference mounts its compressor protection and control subsystem to the shell of its compressor.

Because Persem invites the use of known techniques for mounting a controller; and Millet mounts a compressor protection and control subsystem to the shell of a compressor; we are persuaded that the references would have suggested mounting Persem's controller to the shell, i.e., the housing, of a compressor. Alternatively, Millet alone teaches mounting a compressor protection and control subsystem to the shell of a compressor. Therefore, we affirm the obviousness rejection of claim 20.

### *3 . Providing a Warning*

The examiner finds that in Persem, "col. 10, 11. 60 to 63 . . . state that '[a]fter checking for faults, the display is updated so that any problems detected will be shown on the display. Serious faults are also denoted by activating the buzzer 84.'"

(Examiner's Answer at 5.) The appellants argue, "there is nothing in . . . Persem . . . that would suggest such a warning signal be sent." (Appeal Br. at 7.)

The question of obviousness is "based on underlying factual determinations including . . . what th[e] prior art teaches explicitly and inherently. . . ." *In re Zurko*, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966); *In re Dembiczak*, 175 F.3d 994, 998, 50 USPQ 1614, 1616 (Fed. Cir. 1999); *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995)). "A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." *In re Bell*, 991 F.2d 781, 783, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

Here, we agree with the examiner's finding that Persem provides a warning that a fault is occurring. As aforementioned, the reference notes fault conditions on its display 80, col. 10, ll. 55-59, and denotes serious faults by activating its buzzer 84. *Id.* at ll. 60-63. We find that Millet also provides a warning that a fault is occurring. As also aforementioned, the reference displays numbers and some alpha characters to indicate various fault codes. Col. 5, ll. 6-9. Therefore, we affirm the obviousness rejection of claim 21.

#### *4. Stopping a Motor*

The examiner finds that in *Persem*, "[i]f the compressor's capacity exceeds the load even when running at its minimum speed, the controller will shut down the motor (col. 12, para. 1)." (Examiner's Answer at 4.) The appellants argue, "it is clear from the claim that it is a signal which is based upon a detection of a fault. For this additional reason, Claim 22 is allowable." (Reply Br. at 3.)

In addressing the point of contention, the Board conducts a two-step analysis. First, we construe the claim at issue to determine its scope. Second, we determine whether the construed claim would have been obvious.

##### *a. Claim Construction*

"Analysis begins with a key legal question -- *what* is the invention *claimed*?" *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1567, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987). In answering the question, "the Board must give claims their broadest reasonable construction. . . ." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1668 (Fed. Cir. 2000).

Here, claim 22 recites in pertinent part the following limitations: "stop[ping] a motor for driving said compressor." Giving the claim its broadest, reasonable construction, the limitations require stopping a motor for driving the compressor in response to a fault.

#### b. Obviousness Determination

Having determined what subject matter is being claimed, the next inquiry is whether the subject matter would have been obvious. Here, we agree with the examiner's finding that Persem stops a motor for driving its compressor in response to a fault. As aforementioned, the reference shuts down the motor and sets the state to CYCLEOFF when the compressor's capacity exceeds the load. Col. 12, ll. 13-16. We find that Millet also stops a motor for driving its compressor in response to a fault. As also aforementioned, the reference stops operation of the scroll machine once an undesirable characteristic is identified. Abs., ll. 12-14. Therefore, we affirm the obviousness rejection of claim 22.

#### *5. Storing Fault Identifying Data*

The examiner finds that "col. 10, ll. 55 and 56, of PERSEM . . . state that '[i]f any of these fault conditions occurs, the error is logged in the system's memory 72. . . .'"

(Examiner's Answer at 6.) The appellants argue, "[c]laim 23 requires that data is stored at the control for later retrieval. Nothing in Persem . . . discloses this feature." (Appeal Br. at 7.)

a. Claim Construction

Claim 23 recites in pertinent part the following limitations: "said data is also stored at said control for later retrieval." Giving the claim its broadest, reasonable construction, the limitations require storing data representing the fault.

b. Obviousness Determination

We agree with the examiner's finding that Persem stores data representing a fault. As aforementioned, if any of monitored fault conditions occurs, the reference logs the error is logged in its memory 72. Col. 10, ll. 55-56. Therefore, we affirm the obviousness rejection of claim 23.

C. OBVIOUSNESS REJECTION OVER PERSEM, MILLET, AND VOSS

Finding that "Voss et al. disclose an electric motor compressor having controls 44, 46 mounted within the compressor housing for improved cooling of the electronic components (col. 4, l. 44)," (Final Rej. at 4), the examiner asserts, "it would

have been obvious to locate the controls . . . within the compressor housing." (*Id.* at 5.) The appellants argue, "given the complete lack of benefit across the prior art to make such a modification, the combination is improper." (Reply Br. at 4.)

As aforementioned, although Persem uses the aforementioned microprocessor-based small computer 56 as a controller for its refrigeration compressor system, the reference does not address physical mounting of the controller. We have found that the omission of such a detail and the recognition of modifications invites the use of known techniques for mounting a controller.

For its part, Voss discloses a known technique of mounting a controller to an "electrically powered refrigeration compressor[]." Col. 1, l. 6-7. To wit, "[c]ontrol electronics for the motor are mounted within the housing and in communication with the refrigerant loop. The control electronics are thereby cooled by the circulating refrigerant mixture." Col. 2, ll. 10-13. Even for circuit board 44, which "does not have any specific cooling requirement . . . the internal electrical hookup is greatly simplified by incorporating this control within a hermetic outer housing 48." Col. 4, ll. 62-65.



Because Persem invites the use of known techniques for mounting a controller; and Voss teaches that mounting control electronics within the housing of a refrigeration compressor cools the electronics and simplifies electrical hookup, we are persuaded that the references would have suggested mounting Persem's controller within the shell, i.e., the housing, of a compressor. Therefore, we affirm the obviousness rejection of claim 25.

#### CONCLUSION

In summary, the rejection of claims 20-23 and 25 under 35 U.S.C. § 112, ¶ 2, is reversed. The rejections of the same claims under § 103(a), however, are affirmed. "Any arguments or authorities not included in the brief will be refused consideration by the Board of Patent Appeals and Interferences. . . ." 37 C.F.R. § 1.192(a). Accordingly, our affirmance is based only on the arguments made in the briefs. Any arguments or authorities not included therein are neither before us nor at issue but are considered waived. No time for taking any action connected with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

LEE E. BARRETT  
Administrative Patent Judge

LANCE LEONARD BARRY  
Administrative Patent Judge

MAHSHID SAADAT  
Administrative Patent Judge

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